

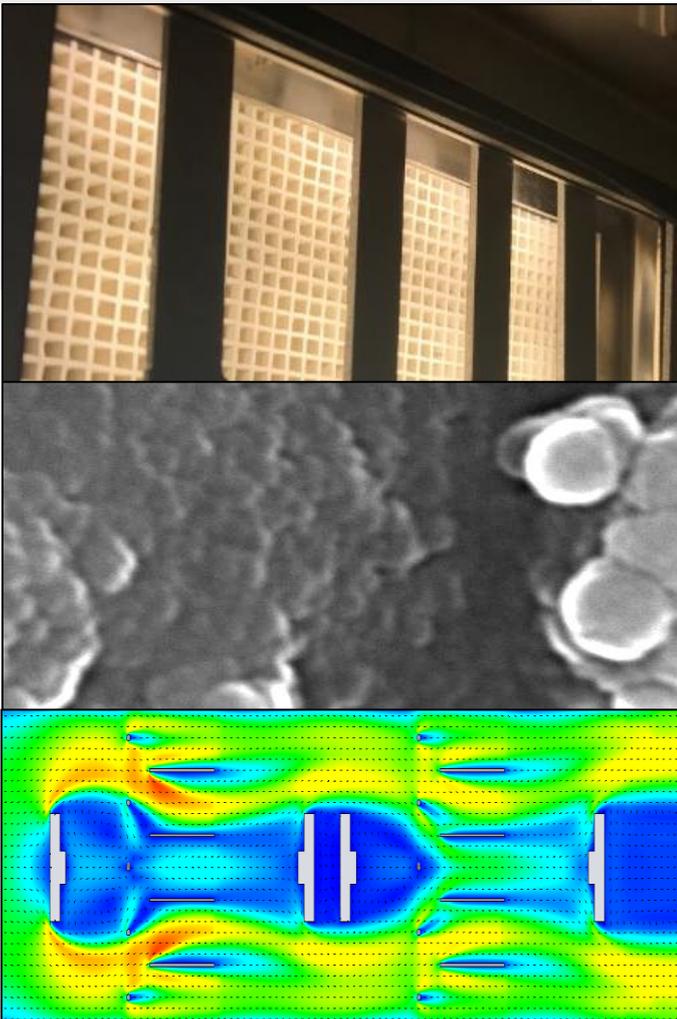
JOA – JPCO; Nano enabled ceramic VOC filters

With over 20 years of experience in manufacturing balanced, integrated vapor extraction systems, JOA is excited to introduce the novel technology of nano enabled ceramic filters, for direct conversion of VOC's and odors in harmless components such as CO₂ and water vapor. The titanium dioxide (doped) nano-particles are developed by the expert-labs of Colorobbia and productized by JOA for industrial applications.

This is how it works:

Titanium dioxide (doped) honey combs

Ceramic Honey Comb elements with controlled micro-porous structure are coated with titanium dioxide (doped) nano particles by a patented procedure. The optimized characteristics of the nano particle enabled ceramic honey combs for flow, activated surface creation and light



penetration, allow for extremely efficient Photo Catalytic Oxidation (PCO) of VOC's by the ceramic filters. The Titanium dioxide (doped) nano particles and the micro structure of the ceramic filters allow for Photo Catalytic Oxidation at pre-selected wave lengths with low energy (107 Watt/m²) LED lights.



Reaction mechanism and efficiency

The absorption of LED light creates photo generated charge carriers and electrons in the conduction band of the Titanium dioxide, whereby two main types of radicals are generated:

1. Hydroxyl radicals ($\cdot\text{OH}$) and
2. Superoxide radical anions ($\text{O}_2^{\cdot-}$).

These radicals oxidize organic molecules (VOC pollutants) present in the airstream, directly on the ceramic TiO₂ coated surface, eliminating odors and VOC pollutants efficiently.



SUSTAINABLE SOLUTIONS

Disruptive, innovative, Clean and Digital

This differentiating nano-particle technology is productized for industrial applications, in standardized modules. To determine the elimination efficiency of VOC's, (mobile) lab-scale units are available, with direct inlet and outlet VOC concentration (PID) measurement and advanced data collection and data logging.

Since 2000 the cost for sensors has reduced by a factor 4, data handling / storage by a factor 10, allowing for Advanced Analytics and Machine Learning based optimization (e.g. on the thousands of long-life LED's installed) to contribute to the fine tuning of nano particle enabled ceramic filters based on Photo Catalytic Oxidation. Contrary to e.g. activated carbon, this super clean technology does not produce any, to be disposed filtration media.



This example unit (1 module) consist of 12 layers, with in total 192 nano honey combs, producing PCO for treatment of high concentrations of ethanol in process air.

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